

REMARKS

Responsive to the Office Action dated September 11, 2003, Applicant appreciates the Examiner's acceptance and entry of Applicant's Request for Continued Examination. Applicant also appreciates the withdrawal of the art rejections based on JP 08-287952 A. In this amendment, Applicant has cancelled Claim 16, amended claims 1 and 13, and has added new Claims 28 and 29. Accordingly, Claims 1-5, 6-15, and 16-29 are pending for consideration, with claims 1 and 13 being independent.

I. Summary of the Claims

Independent Claim 1 recites a nonaqueous electrolyte secondary battery comprising a positive electrode comprising a positive-electrode active material, a negative electrode comprising a particulate negative-electrode active material, and a nonaqueous electrolyte solution. The positive-electrode active material and the negative-electrode active material are both capable of intercalating/deintercalating lithium. The negative electrode further comprises carbon fibers and carbon flakes disposed in the interstices between the particulate negative electrode active material. The ratio by weight of the carbon fibers to the carbon flakes in the negative electrode is in a range of 0.2 to 100. The carbon fibers are produced by vapor phase deposition, and the carbon flakes have a (002) interplanar spacing of less than 0.3360 nm by X-ray diffractometry and a thickness of (002) c-axis crystallites of 100 nm or more and the bulk density of the carbon flakes, as measured by Japanese Industrial Standard K-1469, is 0.4 g/cm³ or less, and the maximum particle size of the carbon flakes, as measured by laser diffraction, is 50 μ m or less.

Independent Claim 13 recites a nonaqueous electrolyte secondary battery comprising an electrode composite and a nonaqueous electrolyte solution. The electrode composite comprises a positive-electrode, including a positive-electrode active material, and a negative electrode,

including a particulate negative-electrode active material. The positive electrode and the negative electrode are wound by several turns together with a separator disposed therebetween. The negative electrode further comprises carbon fibers and carbon flakes disposed in the interstices between the particulate negative electrode active material. The ratio by weight of the carbon fibers to the carbon flakes in the negative electrode is in a range of 0.2 to 100. The carbon fibers are produced by vapor phase deposition, and the carbon flakes have a (002) interplanar spacing of less than 0.3360 nm by X-ray diffractometry and a thickness of (002) c-axis crystallites of 100 nm or more and the bulk density of the carbon flakes, as measured by Japanese Industrial Standard K-1469, is 0.4 g/cm³ or less, and the maximum particle size of the carbon flakes, as measured by laser diffraction, is 50 µm or less.

II. Claim Objections

Claim 16 was objected to under 37 CFR 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. In view of the Examiner's suggestions, Applicant has canceled Claim 16 thereby rendering this objection moot.

III. The § 102(e) Rejection

Claims 1-3 and 5-27 have been rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication No. 2003/0129494 A1 to Kaneda et al. For the following reasons, Applicant respectfully submits that the present invention is not anticipated under § 102(e) and requests reconsideration and withdrawal of this rejection.

Claims 1-3 and 5-27 are not anticipated by the cited reference because Kaneda fails to teach each and every limitation of these claims.

Applicant's nonaqueous electrolyte secondary battery includes a positive electrode, a negative electrode and a nonaqueous electrolyte solution. The positive electrode comprises a positive-electrode active material. The active material may be, for example, a lithium compound

oxide and a binder. Applicant's negative electrode comprises a particulate negative-electrode active material, carbon fibers, and *carbon flakes*. The active material may be a carbonaceous material such as graphite. The carbon fibers and *carbon flakes* are dispersed in the interstices between the particulate negative electrode active material and the ratio by weight of the carbon fibers to the carbon flakes in the negative electrode ranges between 0.2-100. The positive-electrode active material and the negative-electrode active material are both capable of intercalating/deintercalating lithium. Accordingly, both of independent claims 1 and 13 recite a negative electrode containing an active material, carbon fibers and *carbon flakes*.

Kaneda teaches a lithium secondary battery having oxide particles embedded in particles of carbonaceous materials as a negative active material. In particular, Kaneda teaches a positive electrode formed from a mixture of LiCoO_2 active material with an average particle size of 10 μm , *scale-formed graphite powder* having an average particle size of 5 μm , a binder and an aluminum foil current collector. *See* paragraphs 40-44; *see also* paragraphs 53-56. Kaneda also teaches a negative electrode active material comprising a SiO -graphite-pitch composite powder. Oxide particles containing at least one element selected from Sn, Ge, Al, Zn, Bi and Mg may be used in addition to Si. This active material is mixed with *scale-formed graphite powder* (as a negative electrode electroconductive material), carbon fibers having an average particle size of 0.2 μm and an average length of 30 μm , and a binder. This mixture is then applied to a current collector. *See* paragraphs 86-89 and 96-98.

Kaneda does *not* teach a negative electrode having an active material, carbon fibers and *carbon flakes*. Because Kaneda fails to disclose every limitation of independent Claims 1 and 13, it does not anticipate these claims and the claims depending therefrom and cannot therefore be used to support a rejection under § 102(e). Applicant therefore respectfully requests that this rejection be withdrawn.

IV. The § 102(b) Rejection

Claims 1-3, 5, and 13-18 have been rejected under 35 U.S.C. § 102(b) as being anticipated by the IPDL JPO machine translation for JP 09-027344 A and as evidenced by the Derwent abstract for JP 09-027344 A. For the following reasons, Applicant respectfully submits that the present invention is not anticipated under § 102(b) and requests reconsideration and withdrawal of this rejection.

JP 09-027344 discloses a nonaqueous electrolyte secondary cell in which a mixture of flaky graphite and fibrous carbon are added to the LiMO₂ conductive agent used to form the positive electrode. In an apparent response to Applicant's previously-filed argument (against a § 103(a) rejection involving the same reference) that the conductive materials used to form a positive electrode and a negative electrode are very different materials (LiMO₂ versus particulate carbon), the Examiner asserts that "the term 'positive electrode' and 'negative electrode' are relative terms depending on whether the battery is charging." However, Applicant respectfully submits that the terms positive electrode, negative electrode, anode and cathode have defined meanings are not relative terms. Applicant attaches hereto as Exhibit A definitions of the terms "anode" and "cathode" as shown in Hawley's Condensed Chemical Dictionary (12th ed.). Anode is defined as "the positive electrode of an electrolytic cell, to which negatively charged ions travel when an electric current is passed through the cell. Cathode is defined as "the negative electrode of an electrolytic cell, to which positively charged ions migrate when a current is passed"

Accordingly, JP 09-027344 does not teach or suggest a negative electrode having an active material, carbon fibers and carbon flakes. Because JP 09-027344 does not disclose every limitation of independent Claims 1 and 13, it does not anticipate these claims and the claims

depending therefrom and cannot therefore cannot be used to support a rejection under § 102(b).

Applicant therefore respectfully requests that this rejection be withdrawn.

V. The § 103(a) Rejection

Claims 1-3, 5, 6, 9-19 and 22-27 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over EP 0871233 A1 in view of JP 09-027344 A. For the following reasons, Applicant respectfully submits that the present invention is not obvious under § 103(a) and requests reconsideration and withdrawal of this rejection.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

EP 0871233 A1 does not teach or suggest the claimed invention. As stated in the Office Action, EP 0871233 A1 discloses a nonaqueous electrolyte secondary battery comprising a positive electrode comprising a positive-electrode active material capable of intercalating/deintercalating lithium and a nonaqueous electrolyte solution wherein the negative electrode comprises carbon flakes and carbon granules. However, as stated on page 6 of the Office Action, "EP 0871233 A1 does not disclose that the negative electrode comprises carbon flakes and carbon fibers."

JP 09-027344 A also does not teach or suggest the claimed invention. As discussed above in connection with the § 102(b) rejection, positive electrodes and negative electrodes are

defined terms. The addition of flaky graphite and fibrous carbon to the LiMO₂ conductive agent used to form the positive electrode disclosed in JP 09-027344 A was intended to maintain the structural integrity of the LiMO₂. There is no teaching or suggestion of adding flaky graphite or fibrous carbon to the negative electrode. Further, there is no teaching or suggestion of adding carbon fibers or carbon flakes to the negative electrode so as to improve retention of the electrolyte solution. Specifically, JP 09-027344 A does not teach or suggest the addition of carbon fibers produced by vapor phase deposition, and carbon flakes having a (002) interplanar spacing of less than 0.3360 nm by X-ray diffractometry and a thickness of (002) c-axis crystallites of 100 nm or more and the bulk density of the carbon flakes, as measured by Japanese Industrial Standard K-1469, is 0.4 g/cm³ or less, and the maximum particle size of the carbon flakes, as measured by laser diffraction, is 50 μ m or less.

Finally, *prima facie* obviousness requires that there must be a reasonable expectation of success when prior art is modified or combined. In the present application, there is no reasonable expectation of success in achieving the invention as claimed when the cited references are modified or combined. As discussed above, none of the cited references contain all the elements of Applicants' independent claims. Unless all the elements are taught by the references, there can be no success in modifying them.

Thus, at the time the present invention was made, neither EP 0871233 A1 nor JP 09-027344 A teach or describe *all* of the limitations claimed by Applicant in its independent claims and the claims depending therefrom. Accordingly, independent claims 1 and 13 and the claims depending therefrom are nonobvious under § 103 (a).

VI. Conclusion

Accordingly, Applicant respectfully submits that the present application is now in condition for allowance and courteously solicits the same. If the Examiner should have any

questions regarding the foregoing, she is encouraged to call the undersigned at 816.460.2516.

Should any fees be necessitated by this response, the Commissioner is hereby authorized to deduct any such fees from Deposit Account No. 19-3140.

Respectfully submitted,

SONNENSCHEIN NATH & ROSENTHAL LLP

By



Lara Dickey Lewis, Reg. No. 48,161
P.O. Box 061080
Wacker Drive Station, Sears Tower
Chicago, IL 60606-1080
816-460-2516 (telephone)
816-531-7545 (facsimile)

ATTORNEYS FOR APPLICANT